An Academic Approach to Educate PLM

TECHNISCHE UNIVERSITÄT DARMSTADT

Experiences Gained by Using UGS Software Products in CAD-Training Classes

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Technische Universität Darmstadt

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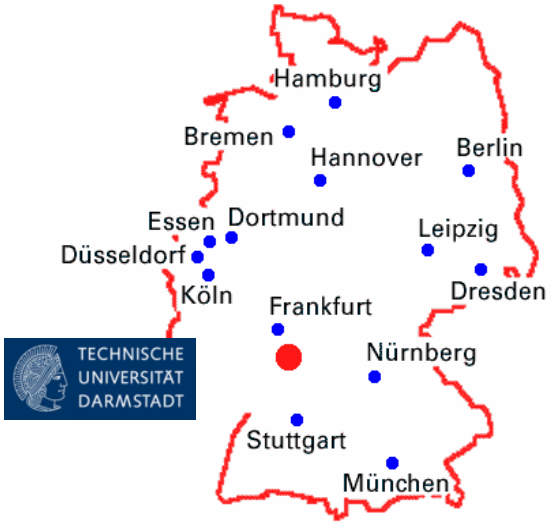
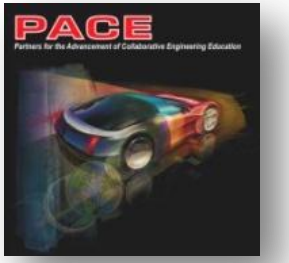
Statistics:

- 13 Faculties
  - 50% Engineering
  - 35% Natural Sciences
  - 15% Humanities
- 270 Professors
- 18000 Students
- 22% Students from foreign countries



Highlights:

- First autonomous university in Germany (since 2005)
- First PACE university in Germany (since 2003)
- best practice – Hochschule 2001
- One of the leading universities fulfilling Bologna Declaration in Germany
- More than 70 partnerships throughout the world



PACE Partners

GM EDS hp invent SIEMENS Sun microsystems

Department of Computer Integrated Design

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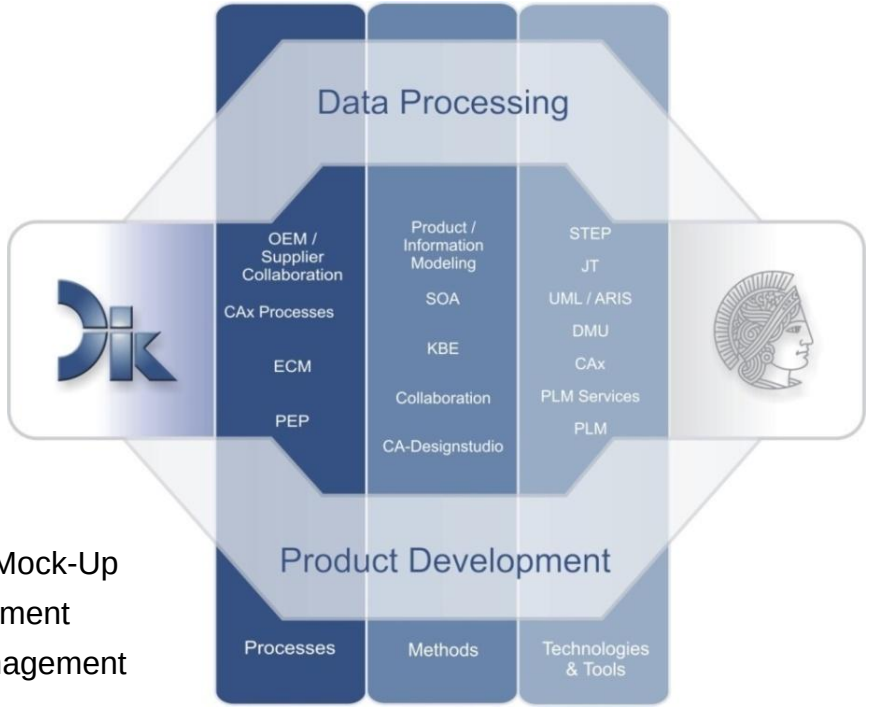
Statistics:

- Belongs to the Faculty of Mechanical Engineering
- Head: Prof. Dr.-Ing. R. Anderl
- 17 scientific assistants
- 5 administrative employees/trainees



Methods:

- CAx Modeling an Analyzing
- Collaborative Engineering
- Software Architectures
- Knowledge Management
- Product Data and Process Modeling

Technologies:

- CAx
- Visualization / Digital Mock-Up
- Product Data Management
- Product Lifecycle Management

Introduction

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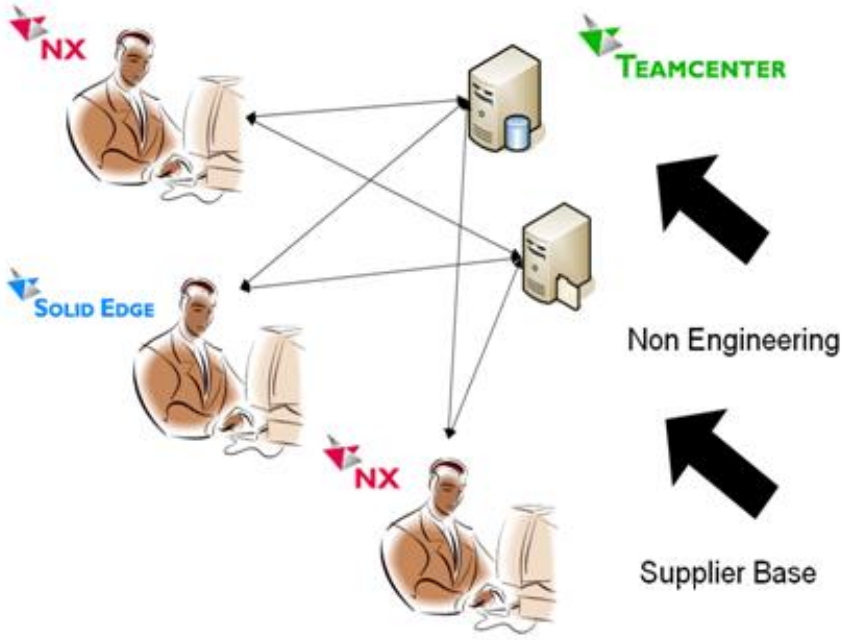
- **Increasing competition forces enterprises to:**
  - Introduce their products faster to the market
  - Develop in less time
  - Reduce costs
  - Improve product quality
  - Increase their ability to innovate



Enterprises push

- Distributed product development
- Collaboration with suppliers and service providers

Link to Academia

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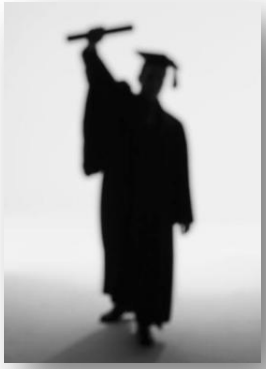
Where is the link to Academia?

Universities form the Engineers of the future!

Engineering graduates need:

- To have all necessary technical expertise
- To have the ability to effectively communicate
- To be able to interact in multidisciplinary teams
- To be able to work in intercultural environments
- To be able to think in process chains



CAD-Training at Universities

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Current situation:

- Often graduate level classes
- Sometimes 2D CAD only
- Often tool-teaching only
- No methodology
- Not enough process knowledge
- No collaboration in teams

TUD‘s Faculty of ME Philosophy

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TUD’s approach:

- 3D-CAD with PDM Interface
- Mandatory classes at undergraduate level for all ME programs
- Students are trained to think along process chains
- Collaboration in teams over PDM system
- 3D-CAD as modeling technique
- Following classes are set on top of the basic CAD training and extend the knowledge step by step
- Design is taught in separate classes following CAD training

CAD Education at TU Darmstadt

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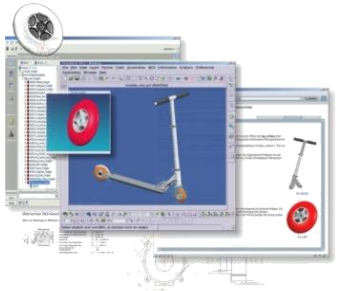

Lecture
„Basic CAD-Training“ (undergraduate level)

Advanced Design Project
„Collaborative Engineering“ (graduate level)

formula student germany

Formula Student Team
„TU Darmstadt Racing Team (TUDART)“

Software Tools

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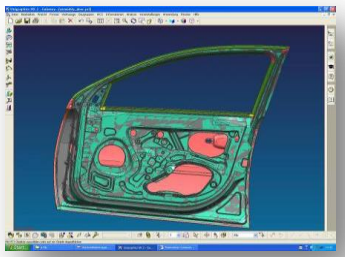

Computer Aided Design (CAD):

- NX5 with latest Maintenance Pack
- UG Manager

Product Data Management (PDM):

- Teamcenter Engineering 2007
- Two Tier Deployment
- Portal Rich Client

Courseware:

- Learn2L Learn Data Management
- Deployment over WWW
- Browser as Client

Components of the Basic CAD-Training

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Lecture
2hrs./week

- Different sections / content
- On-site training / self-practice
- Related examination

Tutorial
3hrs./week

NX

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Self-Practice
4hrs./week

NX

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Organization of the Basic CAD-Training

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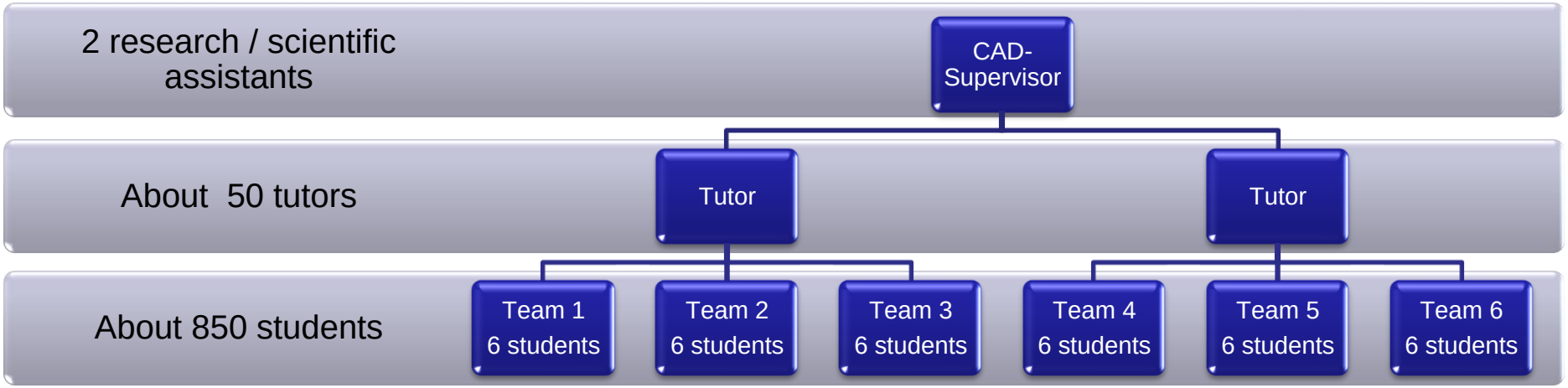

- Students work together in teams
- Mentoring students as tutors (graduate level)
- Supervising research assistants (responsible for the organization)

Topics of the Basic CAD-Training

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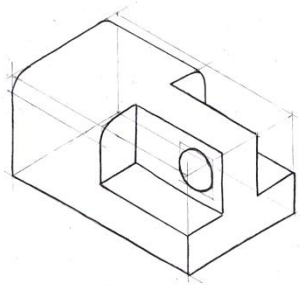
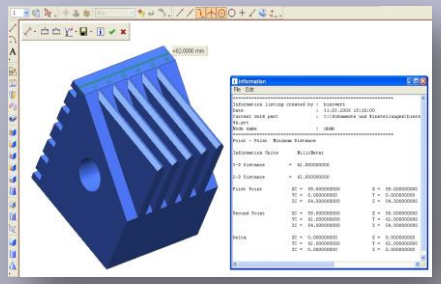
Hand sketching

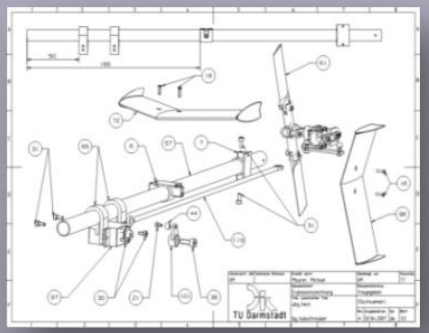


Part Modeling



Assembly Modeling

Documentation



Using NX 5 and TCE 2007

NX

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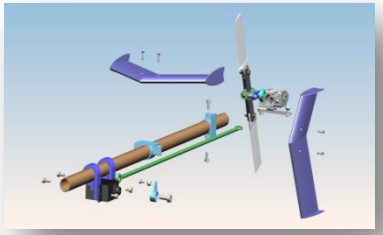
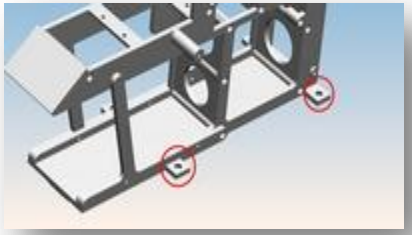
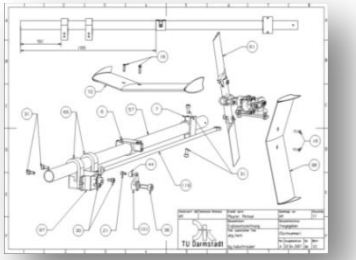
Team Examination



Parametric modeling



Packaging

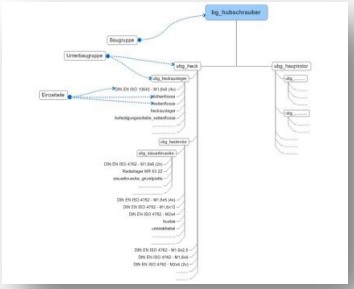


Documentation

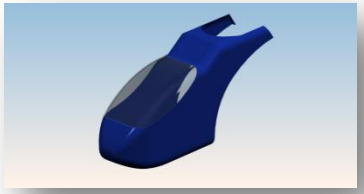
Visualization

Project management

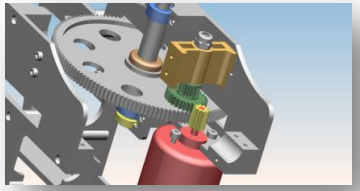
Teamcenter Engineering



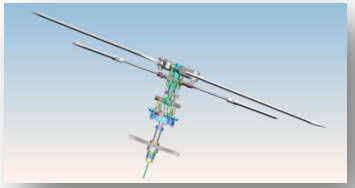
Product structure



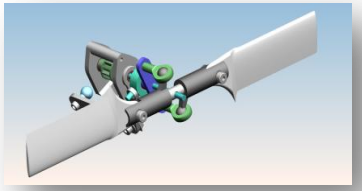
Cockpit



Engine



Main rotor



Back rotor

How to Manage the Course

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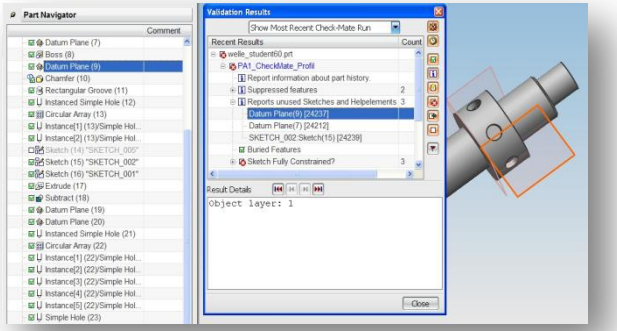
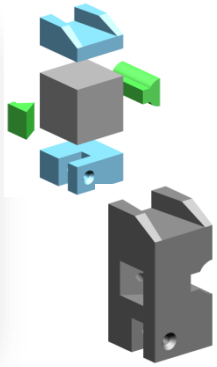
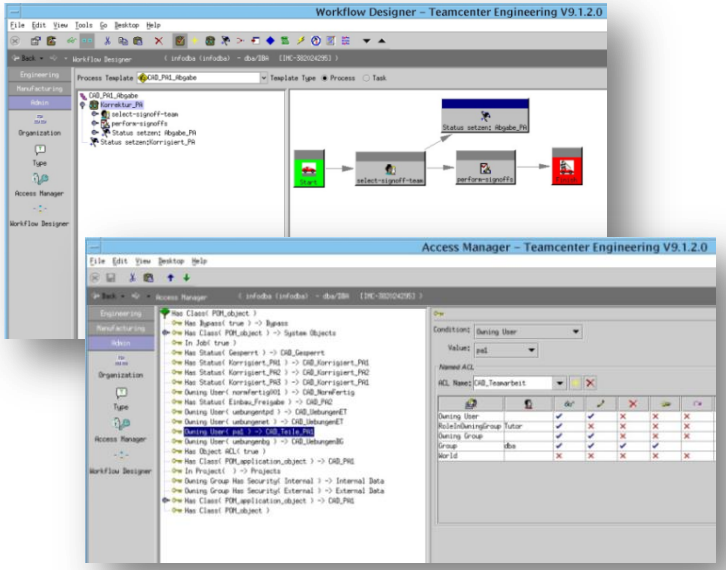
Examination and learning success:
- Tool for automatic generation of models
- Checker for supporting the correction
- Using Knowledge Fusion





TCE Configuration:
- Complete class structure is implemented
- Using persons, user, groups and roles
- Manage privileges



Workflows:
- Different workflows
- Team communication and organization
- Review tasks for examinations

Advanced Design Project „Collaborative Engineering“

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Global project:

- 5 Universities
- Automotive design tasks
- Global teams

Project consists of two main elements:

Seminar series

- Six weekly lectures
- Alternating from different locations
- Submitted via videoconference

Design training

- At least 80 hrs. of practical work

Challenges:

- Different time zones
- Cultural and linguistic differences
- Asynchronous work

Solutions:

- Concurrent Engineering
- Scheduled meetings
- English as working language

Advanced Design Project „Collaborative Engineering“ II

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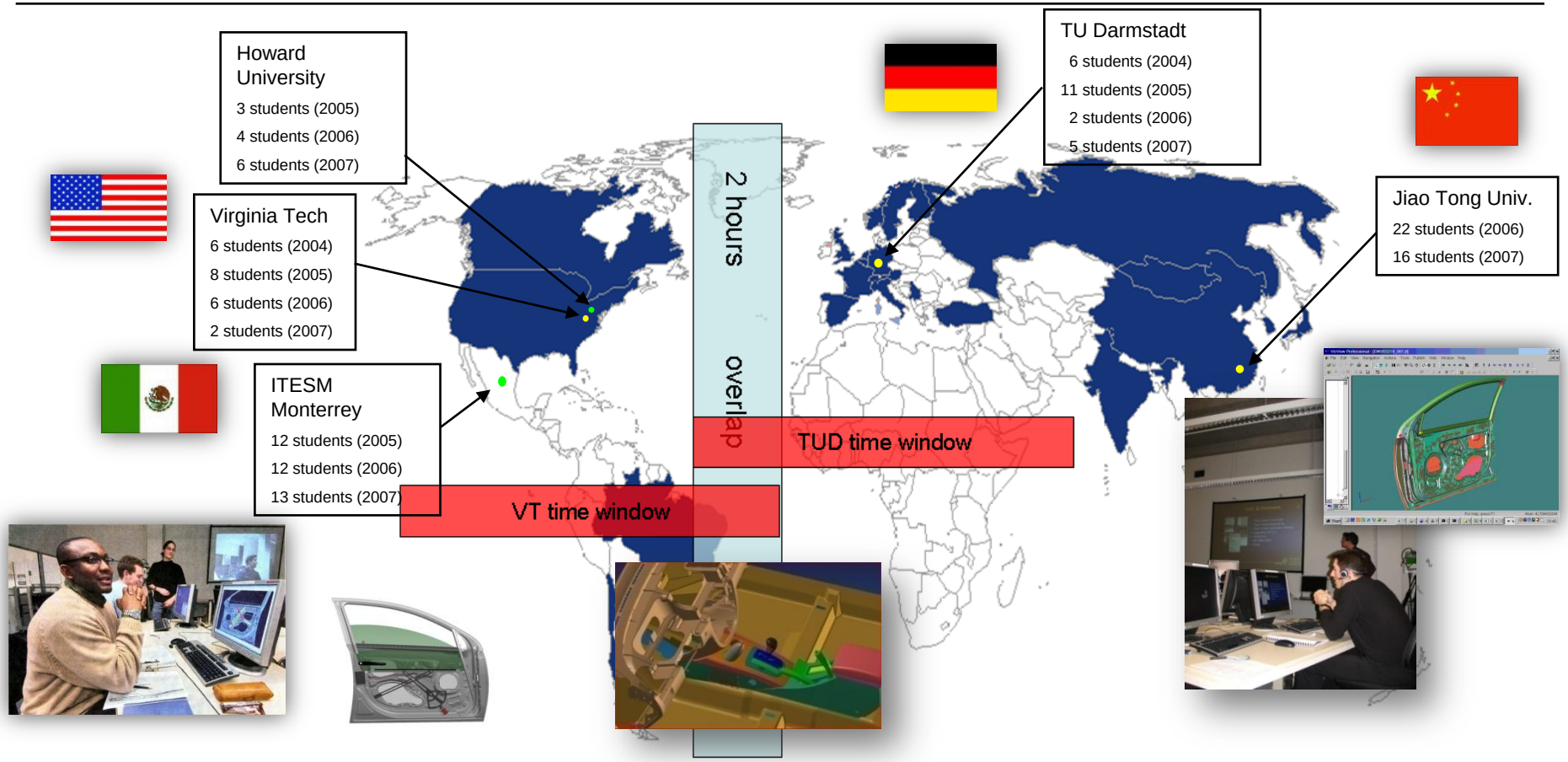

Teamcenter tools support:

- *„Virtual“ teams*
- *Central database*
- *Quality gates / workflows*

TEAMCENTER

Formula Student Team Darmstadt

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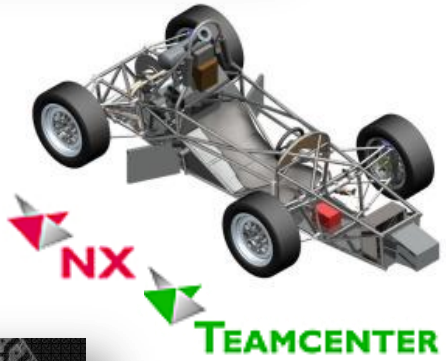
Formula Student Competition :

- International design competition
- 250 Universities
- Design of a race car in a virtual company

TUDART Team:

- 40 students
- Design in NX
- Using Teamcenter Engineering
- 2nd best newcomer at Hockenheimring 2006



Conclusiones

- PLM is a framework of strategies, abilities and tools and therefore has special challenges for education
- 3D-CAD with PDM Interface at undergraduate level classes is challenging but not impossible
- The introduction of PDM technology leads to a more structured class
- Properly set up PDM technology can help with medium/large class administration
- Teamwork in CAD classes trains both social competences and skills in using groupware technology

Thank you

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